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## A METHOD FOR PACKAGING CD, DVD AND THE LIKE

## BACKGROUND OF THE INVENTION

The present invention relates to procedures and apparatuses for packaging disc-shaped digital record carrier for recording information in digital form, known as CDs (Compact Discs) or DVDs (Digital Versatile Discs).

In particular, the invention relates to a new method for packaging the above mentioned discs into book-like containers, including one or more trays, each of which is aimed at receiving one disc.

## DESCRIPTION OF THE PRIOR ART

Discs containing information in digital form, and mainly those containing audio data (CD) or audio-video (DVD), are often packaged in foldable containers, aimed at containing one or more discs.

These containers are made from a blank, usually formed by a printed cardboard, divided in sections, which can be folded one over another toward the inside of the container.

The section folding order depends on the width of the section connecting areas, which are to form the sides of the container.

25 The width of one connecting area must be determined taking into consideration the whole thickness of the sections already folded one over another.

The inner faces of some, or of all, above mentioned sections have, associated thereto, trays made in plastic

material, usually transparent, shaped in such a way, as to contain and removably lock a corresponding disc.

The trays are fastened to the corresponding sections by applying, by suitable devices, a layer of glue onto the 5 surface of the tray aimed at matching with the section of the blank.

Then, the trays are put on the sections by suitable manipulating means.

The so obtained container is then conveyed to a filling 10 station, in which other manipulating means arrange the discs in the respective positions, after locating above their seats.

A drawback, which is often reported in the automatic machines performing the above operations, derives from 15 the fact that, although each tray is positioned on the corresponding section of the blank with extreme precision, the glue which must mutually fasten the two elements, does not act immediately, and consequently, the position of a tray with respect to the container can be 20 changed during transport of the container after gluing.

These possible position changes, even if small, can put at risk the subsequent positioning of the disc in the relative seat and interrupt, or at least delay the discs packaging operations.

25 Known packaging machines have tried to solve the above problem by introducing devices for centering the disc on the relative tray, before the disc is positioned on the tray.

These devices act on each disc, detecting the exact 30 position of the corresponding tray, previously glued to the relative blank section, by suitable sensor means.

The position of the disc manipulating means can be corrected, in order to bring it in axis with the seat. This increases considerably the apparatus complexity, and consequently, its cost.

5 The discs must be centered one by one, therefore the above described apparatuses cannot operate on more discs at the same time.

Since it is not possible to define a fixed flush-reference point in the packaging machine, the size 10 change-over, with containers having different number of trays, or with trays folded in a different order, becomes extremely complicated and it can create devices calibration problems, as well as increase the machine downtimes.

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#### SUMMARY OF THE INVENTION

The object of the present invention is to propose a method for packaging disc-shaped digital record carriers for recording information, such as CDs and DVDs, in trays 20 associated to suitable containers, according to which method the discs are introduced into said trays independently from undesired movements of the trays with respect to the blanks, after the gluing operation.

Another object of the present invention is to propose a 25 method which allows a secure positioning of a plurality of record carriers on the trays, arranged parallel, independently from undesired movements of the trays.

The above mentioned objects are achieved by means of a method for packaging disc-shaped digital record carriers 30 in a corresponding folding package, said package including a blank and a tray fastened to a corresponding

section of said blank, said method being characterized in that it includes a cyclical repetition of the following operation steps:

- Feeding a tray along a first path of a line for 5 packaging said discs, said tray having in its first surface a housing for receiving a disc;
- Feeding a disc along a second path of said packaging line, converging toward said first path at a convergence point, and moving said disc until it is aligned with the 10 housing of the tray;
- introducing said disc in said housing;
- feeding said blank along a third path of said packaging line, said third path intersecting said first path at an assembling station of said package, downstream 15 of the above mentioned convergence point between the first path and the second path;
- placing said tray and said section in mutual alignment, after introduction of the disc into said tray;
- assembling, in said assembling station, said tray to 20 an inner surface of said section, with interposition of a layer of gluing material, to fasten said tray to said section and to obtain said package;
- conveying said package toward a station, where it is folded to the closed conformation.

25 According to a different embodiment of the invention, the method is for packaging disc-shaped digital record carriers in a corresponding folding package, with said package including a blank and a predetermined number of trays, each of said tray being fastened to a 30 corresponding section of said blank, said method being

characterized in that it includes a cyclical repetition of the following operation steps:

- feeding a predetermined number of trays, set side by side, along a first path of a line for packaging said discs, each of said tray having a housing in a first surface for receiving a disc;
- feeding as many discs as there are trays on the first path of the packaging line, along a second path of said packaging line, converging toward said first path at 10 a convergence point, and placing each disc in alignment with a housing of a corresponding tray;
- introducing each of said discs in a corresponding housing;
- feeding said blank along a third path of said packaging line, said third path intersecting said first path at an assembling station of said package, downstream 15 of the above mentioned convergence point between the first path and the second path;
- setting each of said trays in alignment with a corresponding section, after the introduction of the discs into said trays;
- assembling, in said assembling station, each of said trays to the inner surface of the corresponding sections, with interposition of a layer of gluing material, in 25 order to fasten each tray to a corresponding section and to obtain said package;
- conveying said package toward a station, where it is folded to the closed conformation.

Preferred features of the invention are defined in the 30 dependent claims.

**BRIEF DESCRIPTION OF THE DRAWINGS**

The invention will now be described in more detail with reference to particular, non-limiting embodiments and 5 with reference to the accompanying drawings, in which:

- Figures 1A, 1B, 1C, 1D are schematic top views of some containers of the type to which the invention refers, which differ one from another by the number of disc seats;
- 10- Figure 2 is a schematic sequence of packaging of discs according to the invention, in a container of the type shown in Figure 1A;
- Figure 3 is a schematic sequence of packaging of discs according to the invention, in a container of the 15 type shown in Figure 1D.

**BEST MODES OF CARRYING OUT THE INVENTION**

With reference to the Figures 1A, 1D, 1B, 1C, the reference numerals 10, 110, 120, 130 indicate 20 respectively an equal number of foldable packages in open configuration.

The packages are aimed at containing one or more CDs, DVDs or similar record carriers for storing information in digital form.

25 The difference between the packages 10, 110, 120, 130 lies in the number of discs they can contain.

In particular, there are shown packages for 1, 2, 3 and 4 discs, respectively, but generally these packages can contain any number of record carriers.

With particular reference to Figures 1A and 2, taken as an example, the package 10 includes a blank 11, formed by three sections 16, 13, 17, arranged one beside another.

The sections are separated one from another in known way,  
5 by connection areas 18, 19, whose width is different in function of the folding order of the package 10.

The package 10 includes also a tray 12, made in a first surface 14 of a housing 15 for receiving a corresponding disc 1.

10 The tray is to be assembled with the blank 11 in correspondence to the inner surface 13a of the section 13, in ways and times which will be explained in detail in the following description of the present method.

Likewise, ways and times for fastening the tray 12 to  
15 the section 13, by gluing, will be explained better later on.

The remaining sections 16, 17 of the blank 11 contain usually graphics and writings related to the contents of the packaged disc, and are aimed at being folded on the  
20 section 13.

All the above mentioned sections 13, 16, 17 can be provided with pockets for containing, e.g. informative sheets, or even other discs.

The packaging method according to the present invention  
25 will be described in the following, as a mere, non limiting example, with reference to the embodiments related to the packages 10, 110 containing one and four discs, respectively.

In the first case, a sequence of packaging and  
30 contemporary assembling of the packages is performed cyclically on a line for packaging discs 1 to the

packages 10, according to what is reported in detail in the following.

First of all, a tray 12 having a relative housing 15 is fed along a first path A of the packaging line.

5 Suitable and known manipulating means feed a disc 1 along a second path B, converging with the first path A to a filling station, not shown, until the disc is aligned with the housing 15 and above it.

Then, the disc 1 is introduced into the housing 15, in  
10 its definite position, and the tray 12 continues its run along the first path A.

A blank 11, obtained as described previously, is fed along a third path C of the packaging line.

The third path C crosses the first path A, remaining  
15 below the latter, at an assembling station, not shown, situated downstream of the filling station.

The tray 12 is aligned with the corresponding section 13 in the assembling station.

In the meantime, known applying means apply a layer of  
20 gluing material to the lower surface 24 of the tray 12.

Actually, the exact moment of glue application is not critical for the present invention.

In fact, it is all the same whether the glue is applied before the tray 12 is filled with the disc 1, or after,  
25 even in the assembling station.

It is only necessary that the glue is applied before the next step of the method is performed, as it will be described later on.

Moreover, the layer of the gluing material can be applied to the inner surface 13a of the section 13, or both to the latter and to the second surface 24 of the tray 12.

Anyway, the first described way of application is 5 generally easier.

During the subsequent step of the method, the tray 12 is fastened to the inner surface 13a of the section 13, to obtain gluing of the tray 12 and consequently, to complete the package 10.

10 At this point, the package is conveyed to a subsequent folding station, and possible further stations of application of plastic film, according to conventional methods.

As far as the packages 10 containing two or more discs 1  
15 are concerned, the main steps are briefly described with reference to the above mentioned package 110, containing four discs (Figures 1D and 3).

In this case, for each packaging cycle, four trays 112 are fed parallel along the first path A; however, 20 feeding the trays in a series one after another, is also possible.

The trays 112 are preferably maintained one beside another, to control their position in a better way.

25 The housings 115 of the trays 112 are then filled at the same time with the corresponding discs 1, fed on the second path B by the multiple manipulating means, likewise commonly used in the conventional packaging lines.

In the meantime, a blank 111 is fed along the third path 30 C. The blank 111 includes four sections 113 aimed at

receiving the corresponding trays 112, and further sections 116, 117, which are not to receive trays.

The presence of these last mentioned sections is not necessary and depends on the configuration of the package  
5 110.

The sections 113 are separated one from another by connection areas, whose width depends on the folding order of the package 110.

10 The trays 112 are then laterally spaced apart (Figure 3), in relation to the width of different connection areas, and then they are brought in line with the relative sections 113 in the assembly station.

15 Also in this case, a gluing material is applied to the second surface of the trays 113, turned toward the inner surfaces 113a of the sections 113, before their assembling.

20 In the subsequent step, the trays 112 are assembled with the sections 113, to obtain a package 110, and subsequently to convey the package toward further working stations.

25 The above described packaging method, which includes substantially the assembling of the trays 12, 112 to the sections 13, 113 of blank 11, 111, after the trays have been filled with corresponding discs 1, allows, first of all, elimination of the problems deriving from undesired movements of the trays with respect to the blank after their gluing and before the gluing material dries.

30 In this way, a high operation regularity of the packaging machine is obtained, as well as simplification of the structure with respect to similar machines.

This, in particular, occurs because the positioning of the discs with respect to the trays can be defined with extreme precision during their transfer toward the blank.